Status of Risk Informed and Performance-Based Regulation for Nuclear Power Plants

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Acronym Slide

- ANS–American Nuclear Society
- ASME–American Society of Mechanical Engineers
- ASP–Accident Sequence Precursor
- EPRI–Electric Power Research Institute
- LERF – Large Early Release Frequency
- MSPI-Mitigating Systems Performance Index
- NFPA-National Fire Protection Association
- PRA-Probabilistic Risk Assessment
- RG-Regulatory Guide
- ROP-Reactor Oversight Program

Agenda

- Commission Direction on Risk-Informed and Performance-Based Regulations
- NRC Progress
  - Rulemaking
  - Licensing Actions
  - Pilot Programs
  - Reactor Oversight Process
  - Technical Basis Support

Commission Direction

- PRA Policy Statement (60 FR 42622, August 1995)
- SRM for Risk-Informing Regulation (SECY 98-300)
- Reactor Oversight Process (SECY-99-007)
- SRM on Phased Approach to PRA Quality (SECY 04-118)

Risk Informing Part 50
SECY 98-300

- Option 1 – complete current rulemaking (Completed)
  - 50.59 – Changes, tests, and experiments
  - 50.72 – Immediate notification requirements
  - 50.73 – Licensee event reports
  - 50.55a – Codes and standards
  - 50.67 – Accident source term

Risk Informing Part 50
SECY 98-300

- Option 2 – develop risk-informed definitions for “safety-related” and “important to safety” (Completed)
  - 50.65 – Maintenance rule scope
  - 50.69 – Special treatment requirements
    - Regulatory Guide (RG) 1.201 – Categorization for Special Treatment

Risk Informing Part 50
SECY 98-300

- Option 3 – risk-informing remaining sections of Part 50 (Completed)
  - 50.44 – Combustible gas control
  - 50.48(c) – National Fire Protection Association Standard NFPA 805

Risk Informing Part 50
SECY 98-300

- Option 3 – (On going)
  - 50.46a – Emergency core cooling
  - 50.61 – Fracture toughness
  - Advanced Notice of Proposed Rulemaking for risk-informed and performance-based revision to Part 50

Licensing Actions

- Risk-informed licensing actions using (RG 1.174)
- Risk-informed technical specification initiatives (e.g., flexible completion times)
  - Supporting guidance complete on half
    - Level of licensee implementation varies with the initiative
  - Guidance almost complete on remaining initiatives

Pilot Programs

- Completed: Five RG 1.200 PRA Quality Pilots
- Other Planned Pilot Projects:
  - Categorizing Structures, Systems, and Components for Special Treatment (RG 1.201)
  - Risk-Informed and Performance-Based Fire Protection (RG 1.205)

Reactor Oversight Process (ROP)

- ROP includes:
  - Risk-Informed Baseline Inspections
  - Significance Determination Process
  - Performance Indicators
- Recent Enhancement
  - Mitigating Systems Performance Index (MSPI)

Technical Basis Support
PRA Quality

- PRA standards, with staff participation, being developed by ASME and ANS
- Guidance on related technical issues being developed by staff and industry
- Working with ANS to resolve issues with External Events and Low Power Shutdown standards to meet the December 2008 date

Technical Basis Support
PRA Quality

- RG 1.200 on PRA quality issued for trial use (Feb 2004)
- Included staff position/endorsement of ASME Level 1/LERF PRA standard
- Five pilots performed using ASME standard and RG
- RG 1.200 being revised based on pilots and revised ASME standard

Technical Basis Support
Fire PRA

- Collaborative efforts with RES and EPRI
- Fire PRA methodology (Sept 2005)
- Fire models for use in PRA
  - Draft Verification and Validation (Jan 2006)
  - Plan to issue final report in 2007

Technical Basis Support
SPAR Models

- Internal event models exist for all plants
- Models being developed for external events (e.g., fire, seismic), low power and shutdown, & LERF
  - 8 models available for trial use
- Models support:
  - Significance Determination Process
  - Accident Sequence Precursor Process
  - Review of NFPA-805 activities

Technical Basis Support
PRA Training

- NRC PRA training courses for both management and staff
- Interoffice working group established to review PRA courses
- ASME with NRC, EPRI, NEI, and BWR and PWR Owner’s group developing training on the PRA standards

NRC Progress

- Risk-informed initiatives have enhanced every aspect of reactor regulations
- Steady progress is being made in implementing Commission PRA policy and directions